CLAIMS

1. A method for treating a subject having or at risk of developing a hematologic malignancy, comprising

administering to a subject in need of such treatment and free of indications otherwise calling for treatment with a HIF-1 binding molecule, a HIF-1 binding molecule in an amount effective to treat the hematologic malignancy.

2. The method of claim 1, wherein the indications otherwise calling for treatment with a HIF-1 binding molecule are cancers associated with tumor proliferation mediated by VEGF-induced angiogenesis.

3. The method of claim 1, wherein the hematologic malignancy is a lymphoid disorder or a myeloid disorder.

4. The method of claim 1, wherein the HIF-1 binding molecule comprises a HIF-1 antisense molecule that selectively binds to a HIF-1 coding sequence and inhibits HIF-1 transcription.

5. The method of claim 1, wherein the HIF-1 binding molecule comprises an antibody or an antibody fragment that selectively binds to HIF-1 and inhibits HIF-1 binding to a mdr1-HRE.

6. The method to claim 1, wherein the HIF-1 binding molecule comprises a polypeptide sequence selected from the group consisting of SEQ ID NOs: 63, 64, 65, 66, and 67.

7. The method of claim 1, wherein the HIF-1 binding molecule is administered in conjunction with one or more mdr1-HRE binding molecules.

8. The method of claim 7, wherein the mdr1-HRE binding molecule comprises an antibody that selectively binds to mdr1-HRE and inhibits HIF-1 binding to mdr1-HRE.

9. The method of claim 7, wherein the mdr1-HRE binding molecule comprises a mdr1-

HRE antisense molecule that selectively binds to a mdr1-HRE and inhibits MDR transcription.

10. The method of claim 1, wherein the subject is about to undergo chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

11. The method of claim 1, wherein the subject is undergoing chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

12. The method of claim 1, wherein the subject has recently undergone chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

13. The method of claim 9, wherein the mdr1-HRE antisense molecule comprises a nucleic acid molecule selected from the group consisting of the nucleic acids having SEQ ID NOs. 9, 10, 11, 12, 13, 14, and 15, unique fragments of SEQ ID NOs. 9, 10, 11, 12, 13, 14, and 15, and complements of the foregoing.

14. An isolated nucleic acid comprising a sequence selected from the group consisting of: SEQ ID NOs. 9, 10, 11, 12, 13, 14, and 15, unique fragments, and complements of the foregoing.

15. A pharmaceutical composition comprising one or more nucleic acid sequences selected from the group consisting of: SEQ ID NOs. 9, 10, 11, 12, 13, 14, and 15, unique fragments, and complements of the foregoing.

16. A method for inhibiting MDR expression, comprising:

contacting a nucleic acid encoding an MDR polypeptide with one or more nucleic acids of claim 14 under conditions to allow the one or more nucleic acids of claim 14 to hybridize to the nucleic acid encoding the MDR polypeptide.

17. The method of claim 16, wherein contacting comprises administering one or more nucleic acids of claim 14 to a subject, wherein the subject has or is at risk of developing

multiple drug resistance.

18. The method of claim 17, wherein the subject has or is at risk of developing a hematologic malignancy.

19. The method of claim 16, wherein the nucleic acid molecule(s) are administered in conjunction with an mdr1-HRE binding molecules.

20. A method for treating a subject having or at risk of developing a multiple drug resistance, comprising

administering to a subject in need of such treatment, one or more nucleic acids of claim 14 in an amount effective to treat the multiple drug resistance.

21. The method of claim 20, wherein the subject is about to undergo chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

22. The method of claim 20, wherein the subject is undergoing chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

23. The method of claim 20, wherein the subject has recently undergone chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

24. An isolated HIF-1-SUMO-1 complex comprising:

a HIF-1 molecule selected from the group consisting of HIF-1 and a SUMO-1 binding HIF-1 fragment and

a SUMO-1 molecule selected from the group consisting of SUMO-1 or a HIF-1 binding SUMO-1 fragment

wherein the SUMO-1 molecule is bound to the HIF-1 molecule

25. The isolated complex of claim 24 wherein the HIF-1 molecule is HIF-1α.

26. The isolated complex of claim 24 wherein the HIF-1 molecule comprises the peptide domain located between amino acids 390 and 394 of HIF-1α, inclusive.

27. The isolated complex of claim 24 wherein the HIF-1 molecule comprises the peptide domain located between amino acids 476 and 480 of HIF-1α, inclusive.

28. The isolated complex of claim 24 wherein the HIF-1 molecule comprises the peptide domain located between amino acids 476 and 482 of HIF-1α, inclusive.

29. The isolated complex of claim 24 wherein the HIF-1 molecule comprises the peptide domain located between amino acids 528 and 531 of HIF-1α, inclusive.

30. The isolated complex of claim 24 wherein the HIF-1 molecule comprises the peptide domain located between amino acids 718 and 721 of HIF-1α, inclusive.

31. The isolated complex of claim 24 wherein the HIF-1 molecule comprises the peptide domain located between amino acids 718 and 724 of HIF-1α, inclusive.

32. The isolated complex of claim 24 wherein the HIF-1 molecule comprises a nucleic acid sequence from the group consisting of SEQ ID NOs: 17, 18, 19, 20, and 21, unique fragments, and complements of the foregoing.

33. A method of screening for agents that modulate the amount of a HIF-1-SUMO-1 complex, comprising:

contacting a HIF-1 molecule with a SUMO-1 molecule under conditions that allow the formation of a HIF-1-SUMO-1 complex

determining the amount of the HIF-1-SUMO-1 complex in the absence of the agent,

determining the amount of the HIF-1-SUMO-1 complex in the presence of the agent, and

comparing the amount of the HIF-1-SUMO-1 complex in the presence and absence of the agent,

wherein a decrease in the amount the HIF-1-SUMO-1 complex in the presence of the agent indicates that the agent is a HIF-1-SUMO-1 complex blocking agent, an increase in the level the HIF-1-SUMO-1 complex in the presence of the agent indicates that the agent is a HIF-1-SUMO-1 complex enhancing agent.

34. A kit for screening for agents that modulate the amount of a HIF-1-SUMO-1 complex, comprising:

one or more HIF-1 molecules and one or more SUMO-1 molecules and

instructions for the use of the HIF-1 molecules and SUMO-1 molecules for screening for agents that modulate the amount of a HIF-1-SUMO-1 complex.

35. A method for inhibiting MDR expression, comprising:

contacting a nucleic acid encoding an MDR polypeptide with a HIF-1-SUMO-1 complex blocking agent in an amount effective to inhibit MDR expression.

36. The method of claim 35, wherein the HIF-1-SUMO-1 complex blocking agent is a binding molecule.

37. A method for treating a subject having or at risk of developing a multiple drug resistance, comprising

administering to a subject in need of such treatment and free of indications otherwise calling for treatment with a SUMO-1 binding molecule, one or more SUMO-1 binding molecules in an amount effective to treat the multiple drug resistance.

38. The method of claim 37 wherein the subject has or is at risk of developing a hematologic malignancy.

39. The method of claim 37, wherein the SUMO-1 binding molecule is administered in conjunction with one or more mdr1-HRE binding molecules or HIF-1 binding molecules.

40. The method of claim 37, wherein the subject is about to undergo chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

41. The method of claim 37, wherein the subject is undergoing chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

42. The method of claim 37, wherein the subject has recently undergone chemotherapy, radiation therapy, or a combination of chemotherapy and radiation therapy.

43. The method to claim 37, wherein the SUMO-1 binding molecule is a SUMO-1 antisense molecule.

44. The method to claim 43, wherein the SUMO-1 antisense molecule comprises a nucleic acid sequence selected from the group consisting of SEQ ID NOs: 22, 23, and 24, unique fragments, and complements of the foregoing.

45. The method to claim 37, wherein the SUMO-1 binding molecule is an antibody or an antibody fragment that selectively binds to a SUMO-1-molecule and inhibits the binding of a SUMO-1 molecule to a HIF-1α molecule.

46. The method to claim 45, wherein the antibody is a monoclonal antibody, a polyclonal antibody, or a chimeric antibody.

47. The method to claim 45, wherein the SUMO-1 binding molecule is an antibody or an antibody fragment that selectively binds to a SUMO-1 binding domain of HIF1α and inhibits the binding of a SUMO-1 molecule to a HIF-1α molecule.

48. An isolated nucleic acid molecule comprising a sequence selected from the group consisting of: SEQ ID NOs: 22, 23, and 24, unique fragments, and complements of the foregoing.

49. The molecule of claim 48 wherein one or more nucleic acid molecules selected from the group consisting of SEQ ID NOs: 22, 23, and 24, unique fragments, and complements of the foregoing are contained in pharmaceutical composition.